SUPER

DISPATCHER

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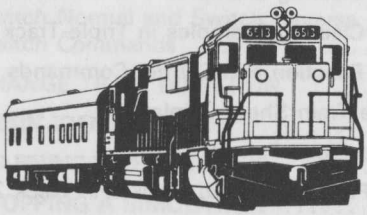
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SECTION 1
INTRODUCTION TO
SUPER DISPATCHER

The SUPER DISPATCHER simulation program is a much expanded version of SIGNAL Computer Consultants' popular TRAIN DISPATCHER game. Many of the features and enhancements present in SUPER DISPATCHER are directly attributable to the many helpful comments and critiques from Train Dispatcher "users."

SUPER DISPATCHER simulates operations in a railroad dispatcher's office equipped for centralized traffic control (CTC). As a dispatcher, you control train movements over a large territory by positioning switches and clearing signals ahead of trains. The objective of the simulation is to move trains quickly, efficiently and safely through the territory to their assigned destinations. Operating time will vary between about one-half hour and two hours or longer, depending on the number of "shifts" selected and clock speed. Your performance is monitored and displayed as you operate, and a Scoring Screen is displayed at the end of each simulation.

As you read through this manual you will find many features and options designed to make operating as realistic and interesting as possible. Three territories are included on the program disk, and a companion program, SUPER TRACK BUILDER, will be available for the design of custom territories that may be used with SUPER DISPATCHER. Current territories contain sections of single, double and triple track. "Fleeting" (automatic signal clearing) is available. Train Sheets and Block Permit displays may be printed out, and, by popular demand, trains may be reversed.

More than 30 display screens, including territory overview and interlocking closeup screens, are available to the dispatcher. All screens are updated in real-time, providing up-to-the-second status of all activity in the territory. Closeup screens for each interlocking contain a "window" displaying portions of the overview on each side of the station. These screens are designed to permit rapid smooth scrolling between stations across the entire territory. Finally, simulations may be saved to disk, permitting you to continue operations at any time.

SECTION 2
HOW TO USE THIS MANUAL

The SUPER DISPATCHER simulation program faithfully simulates a variety of aspects of the Train Dispatcher's job. To fully appreciate an Operations Center we must have at least a basic understanding of how territories are represented, and know labeling conventions for interlockings, signals, switches and track sections. We also need to understand Train Sheets and Block Permit displays, and the fundamental operating procedures for signaling and switching. While more will be learned by operating the simulation than by reading the manual (and operating is much more interesting than reading!), a number of rules and procedures must be understood to become proficient at dispatching. The intent of this manual is to provide guidance in the form of specific operating procedures, and to serve as a reference for these rules and procedures.

This manual is organized under eight section headings, followed by a short appendix. In addition, a colored insert is included covering the specific program loading procedure and key assignments for your computer. Each of the following sections (three through eight) is briefly described below.

Section 3. GETTING STARTED, helps you get the simulation program up and running. It explains procedures for selecting a simulation to run, or to start a new simulation. Several "setup parameters" must be selected. Instructions are also given for starting a simulation run and for stopping or aborting a run.

Section 4. SUPER DISPATCHER TERRITORIES explains what a territory is and introduces the two display screens (OVERVIEW and CLOSEUP) used to view a territory. A number of terms describing territory features (e.g., interlockings, blocks, yards) are defined.

Section 5. IDENTIFICATION OF TRACKS, SWITCHES AND SIGNALS covers the conventions for numbering track sections, switches and signals and how they are represented on the territory displays.

Section 6. SUPER DISPATCHER DISPLAYS gives a quick summary of each of the screen displays (OVERVIEW, TRAIN SHEETS, SCORING, etc.).

Section 7. FUNCTIONS AND CONTROLS contains specific operating instructions and procedures. If you want to get right into dispatching, take a quick look at Section 3 (GETTING STARTED) and go to Section 7. This section covers the bread-and-butter items, such as aligning switches and clearing/canceling signals, and also explains features such as FLEETING and blocks with intermediate signals.

Section 8. PERFORMANCE MEASUREMENT describes some of the performance tracking done by the computer to evaluate a simulation run.

The APPENDIX contains several tables showing block mileages for the three territories, train speed restrictions, warning messages displayed during operation, and color codes for Train Sheet and Block Permit displays.

SECTION 3
GETTING STARTED

Load Simulation Program

To run a SUPER DISPATCHER simulation you will need a computer, disk drive and monitor or TV (color recommended), and the SUPER DISPATCHER program disk.

It is also desirable (but not necessary) to have a printer connected to the system for obtaining printouts of Train Sheets and Block Permits. If you plan to save a simulation run you will also need a formatted diskette with at least 124 blocks free.

A KEYBOARD TEMPLATE is included with this manual. Place it over the computer keyboard. The colored insert in the center of this manual contains instructions for your computer for loading the SUPER DISPATCHER simulation program. It also lists the specific key assignments for your computer. After the programs have loaded the first selection screen is displayed.

Select Simulation

Select SAVED SIMULATION or NEW SIMULATION.

You are given the option to either start a new simulation or to continue with a simulation previously saved to disk.

OPTION A. To continue with a previously saved simulation:

1. Place the disk containing the previously saved simulation in disk drive;
2. Press "Y;"
   The disk directory may be displayed, and you are asked to enter a file name.
3. Enter the file name used to originally save the simulation;

(If the file is not found the selection screen will be displayed again. If the simulation is found, it is loaded and will continue from the point at which it was stopped and saved.)

OPTION B. To select a new simulation:

1. Leave the SUPER DISPATCHER program disk in the drive;

★★★★★★★★★★★★★★★★★★★★★★★★★★★★
DO NOT PRESS RETURN KEY UNTIL ALL ENTRIES HAVE BEEN MADE TO THE SETUP SCREEN!
★★★★★★★★★★★★★★★★★★★★★★★★★★★★

2. Press "N" (to set up a new simulation); The simulation "set-up" screen (Figure 3-1) will be displayed.
   From it you will select:
   a. Number of Shifts (1-3)
      Enter 1, 2 or 3 to select 8, 16 or 24 hours of operation;
   b. Time Multiplier (01-59)
      Enter a number between 01 and 59 to set the speed at which the shift clock will run. A value of 01 sets the clock to "real-time." A value of 10 speeds up operation by a factor of 10 – an eight hour shift will end in 48 minutes.

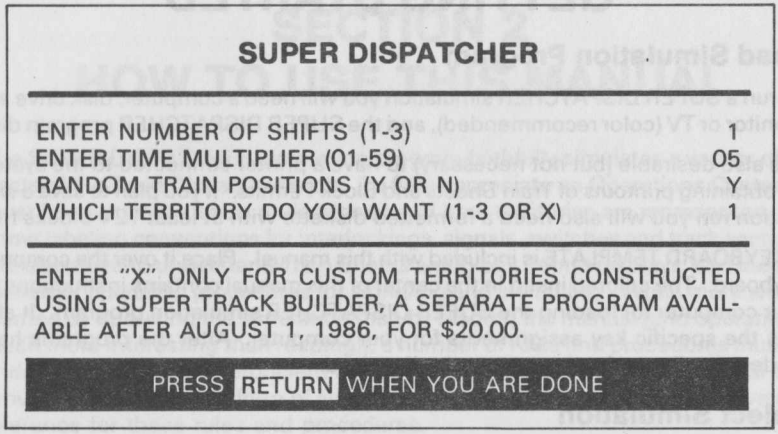

SUPER DISPATCHER
ENTER NUMBER OF SHIFTS (1-3) 1
ENTER TIME MULTIPLIER (01-59) 05
RANDOM TRAIN POSITIONS (Y OR N) Y
WHICH TERRITORY DO YOU WANT (1-3 OR X) 1
ENTER "X" ONLY FOR CUSTOM TERRITORIES CONSTRUCTED USING SUPER TRACK BUILDER, A SEPARATE PROGRAM AVAILABLE AFTER AUGUST 1, 1986, FOR $20.00.
PRESS RETURN WHEN YOU ARE DONE

Figure 3-1. SETUP SCREEN

c. Train Positions (Random or Default)
Enter "Y" to randomly position trains on the territory at the start, or enter "N" to have trains positioned at default locations preset for each territory.

d. Territory Selection (1-3 or X)
Enter 1, 2 or 3 to select one of the three territory configurations included on your program disk. The "X" option may be used ONLY if you have additional custom territories constructed using the separate SUPER TRACK BUILDER program.

Use the CURSOR keys to move among the menu items. DO NOT Press (RETURN) until all menu items are set.

3. Press (RETURN);
The territory selected will load from the program disk, and program parameters (number of shifts, time multiplier and train positions) are set.

The OVERVIEW screen of the territory is now displayed. Note that the shift clock has NOT started. This permits you to set up the territory before your first shift starts.

Set up Territory

Before starting your shift you will want to look at (and possibly printout) Train Sheets and Block Permits. It's also a good idea to align the tracks and clear signals for the trains located on the territory before starting the clock.

If you are not yet familiar with the controls and commands for throwing switches, clearing signals and moving among the displays (Overview, Interlocking Closeups, Trains Sheets, etc.) we recommend you read further into this manual before starting your shift.

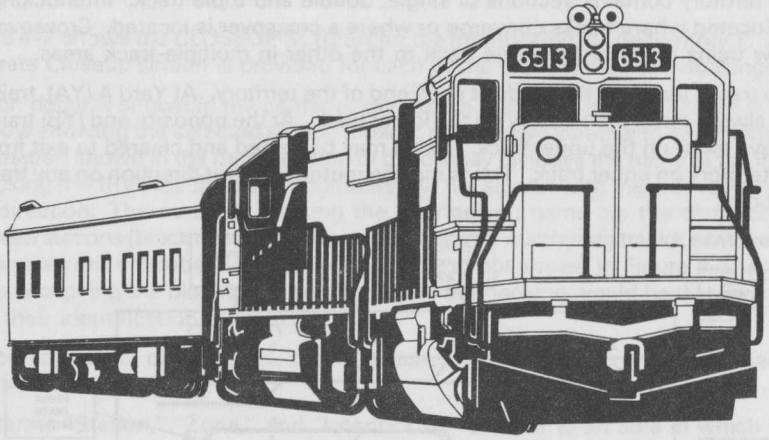
Start Shift

Press (SHIFT) "T" to start the clock running. Your shift begins!

The clock starts at 00:00:00 (hours/minutes/seconds) and increments each second by the time multiplier (1 to 59). Each shift is eight hours long. If one shift has been selected the simulation will end when the clock reaches 08:00:00. A two-shift simulation ends at 16:00:00 and three shifts run the clock to 24:00:00.

Abort Simulation

Once started, the simulation will continue to run until the shift ends. You may use the PAUSE key to temporarily halt the simulation run. To STOP a simulation, press the ABORT key. This displays the SCORING SCREEN (see Section 8). From the scoring screen you may exit the program, save the run to disk, return to the simulation run, or start a new simulation.



SECTION 4
SUPER DISPATCHER TERRITORIES

The SUPER DISPATCHER program is designed to be used with independent territory files – that is, the main simulation program and the territory file it runs against are separate entities. Three territory files (terr1, terr2 and terr3) are included on the SUPER DISPATCHER program disk. We will describe TERR1, the default territory, which is loaded with the simulation program.

Figure 4-1 shows the OVERVIEW display of territory 1. It contains 24 stations or "interlockings" (A through X). At the West end of the territory is Yard A, and Yard B terminates the territory to the East. Viewing the top of the display as "North," then trains traveling to the right are moving East and trains moving to the left are traveling West. Signals cleared right allow trains to move East and those cleared left permit westward train movement. Remember, right = East and left = West.

Trains normally enter the territory from the yards at either end and are directed to exit the territory at the yard at the end opposite entry. In addition, some trains will use one of the two spurs (S2) and (S4) to enter or exit the territory. In this territory, Spur S2 is located between stations S and T (block S-T) and Spur S4 appears between stations P and Q (block P-Q). Both of these spurs are aligned to permit entry to the territory by westbound traffic, or exit by trains moving to the East.

The territory contains sections of single, double and triple track. Interlockings are located where tracks converge or where a crossover is located. Crossovers allow trains to move from one track to the other in multiple-track areas.

Two tracks lead into the yards at each end of the territory. At Yard A (YA), trains will always enter the territory on the lower track. At the opposite end (YB) trains always enter on the upper track. Trains may be routed and cleared to exit from the territory on either track. Trains may be routed in either direction on any track section.

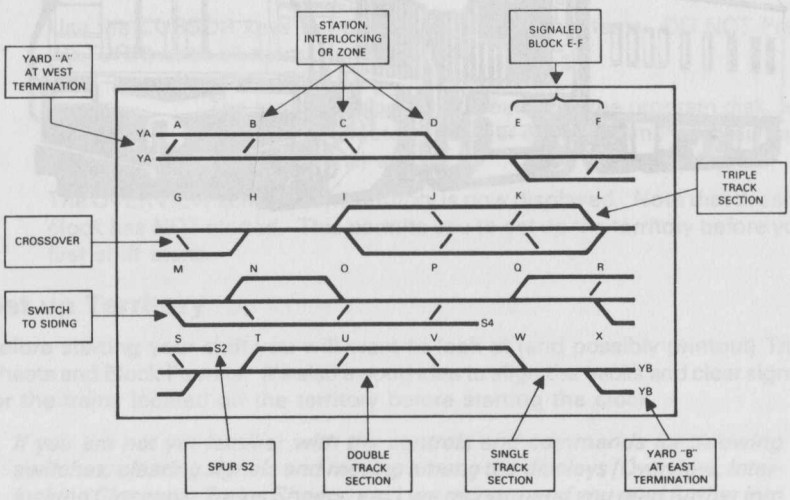


Figure 4-1. TERRITORY 1 CONFIGURATION

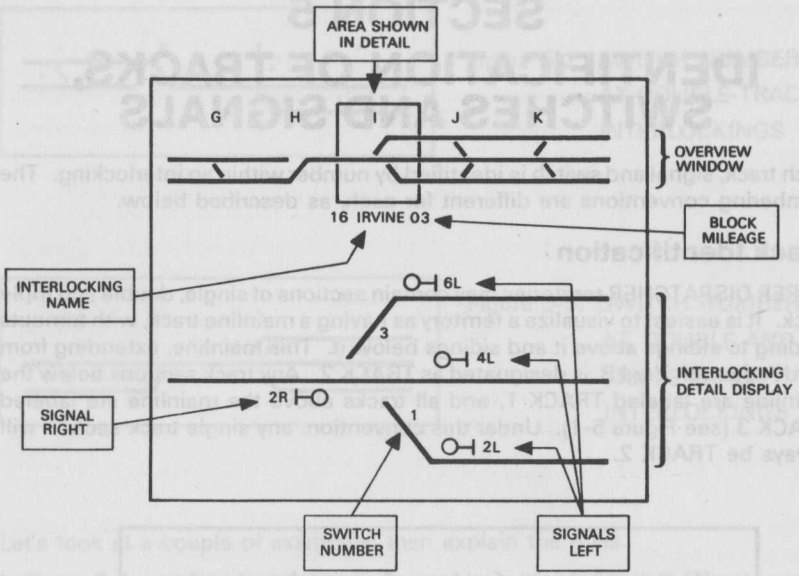


Figure 4-2. CLOSEUP SCREEN AT INTERLOCKING I

Figure 4-2 shows the CLOSEUP SCREEN for the interlocking at I on territory 1. A separate Closeup screen is provided for each of the territory's 24 interlockings.

Station detail is shown in the center of the screen. At the top of the screen is a window showing the selected station (boxed) and the two stations to either side. Information shown in the detail section of the display includes the name of the interlocking (I = IRVINE), the switch numbers and the signals with their ID numbers and direction. The numbers flanking the interlocking name are the distances between stations (block mileage). The conventions for numbering tracks, switches and signals are described in Section 5. Although not shown in Figure 4-2, any trains occupying the block on either side of the interlocking would be displayed, with their identification numbers.

Any commands to clear signals, throw switches or set fleeting can be executed only from a closeup screen.

The terms "Station," "Zone," and "Interlocking" all refer to an area in which a switch is located. The term "Block" designates the area between two stations. For example, "Block I-J" describes the part of the territory that lies between station "I" and station "J."

The terms "Detail Screen" or "Closeup Screen" refer to a display of one station, while "OVERVIEW" refers to display of the entire territory.

With a detail screen displayed, it is possible to move between stations by pressing one of the two NEXT ZONE keys. The NEXT STATION RIGHT key scrolls the display to the next station east and the NEXT STATION LEFT key scrolls to the stations west. This makes it easy to issue and execute commands at several stations quickly without returning to the overview screen. Or, you may press the alpha key corresponding to a station to move to it directly.

SECTION 5
IDENTIFICATION OF TRACKS, SWITCHES AND SIGNALS

Each track, signal and switch is identified by number within an interlocking. The numbering conventions are different for each, as described below.

Track Identification

SUPER DISPATCHER territories may contain sections of single, double and triple track. It is easiest to visualize a territory as having a mainline track, with turnouts leading to sidings above it and sidings below it. This mainline, extending from Yard A through Yard B, is designated as TRACK 2. Any track sections below the mainline are labeled TRACK 1, and all tracks above the mainline are labeled TRACK 3 (see Figure 5-1). Under this convention, any single track section will always be TRACK 2.

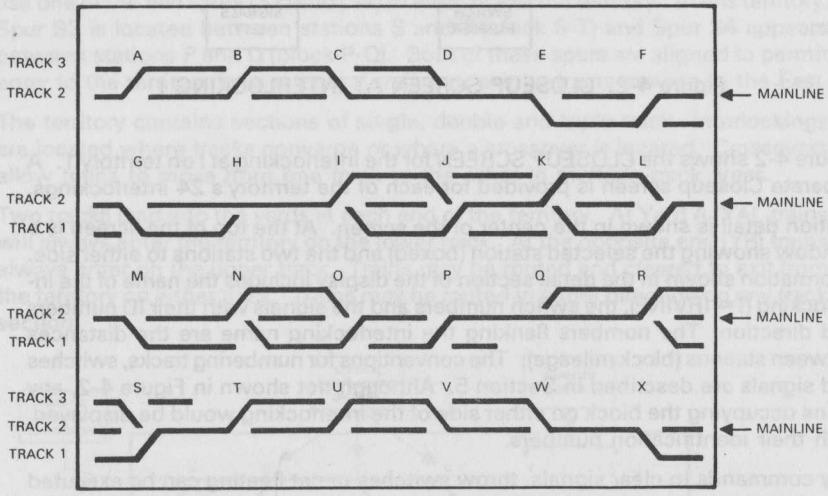


Figure 5-1. TRACK IDENTIFICATION

Switch Identification

Switch identification is relatively simple. A switch at any interlocking having only two tracks (Figure 5-2) is labeled SWITCH 1. At interlockings having three tracks (Figure 5-3), the LOWER switch is always SWITCH 1 and the UPPER switch is SWITCH 3. Switch numbers are shown on the closeup display for each interlocking.

Signal Identification

The convention for labelling signals is somewhat different. A signal label is dependent on both the number of tracks at an interlocking and the direction of travel controlled by the signal.

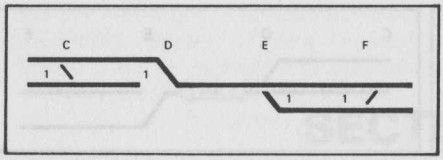


Figure 5-2. SWITCH NUMBERS AT DOUBLE-TRACK INTERLOCKINGS

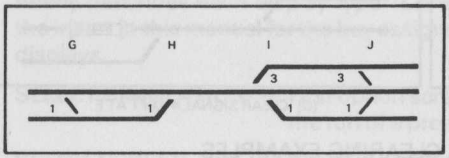


Figure 5-3. SWITCH NUMBERS AT DOUBLE AND TRIPLE TRACK INTERLOCKINGS

Let's look at a couple of examples, then explain the rules.

In Figure 5-4.a a train (double-headed arrow) is waiting in block D-E for the signal to be cleared into the upper track of block E-F. Here, we would clear signal 2-right at station E.

In the next illustration (Figure 5-4.b), the train is waiting to be cleared into the lower track of block E-F. Again we clear signal 2-right at station E.

Next, (Figure 5-4.c), we have a train on the lower track in E-F waiting to be cleared left (westbound) into block E-D. Here, we clear signal 2-left at station E.

Finally, in Figure 5-4.d, the train is waiting on the upper track in E-F to be cleared into E-D. This is done by clearing signal 4-left at station E.

The convention governing signal identification is based on where the train is coming from, not where it is going.

In the first two examples the train was coming from a single-track block, and a signal from a single-track block is always labeled SIGNAL 2.

In the third example, the train was entering the block to be cleared from the lower track of a two-track block. The signal from the lowest track in a multiple-track block is also labeled SIGNAL 2.

In example four, the train is entering the block to be cleared from the upper track in a two-track block. These signals are labeled SIGNAL 4.

Figure 5-5 shows how signals are labeled in triple-track blocks. The dotted line shows the path cleared for a train when the signal is cleared. The arrow, in the second part of each diagram, appears (in green) when the signal is cleared. No trains are present in these blocks.

Refer back to Figure 4-2 showing the detail of Interlocking I. The four signals (2R, 2L, 4L and 6L) controlling traffic through this interlocking are shown. The lights (circles next to signal labels) are red until the signal is cleared. When cleared, a signal light shows green. Commands for clearing and canceling signals are presented in Section 7.4

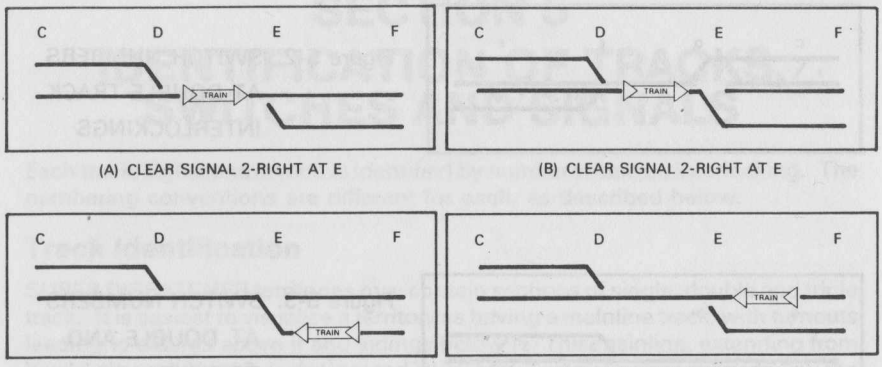


Figure 5-4. SIGNAL CLEARING EXAMPLES

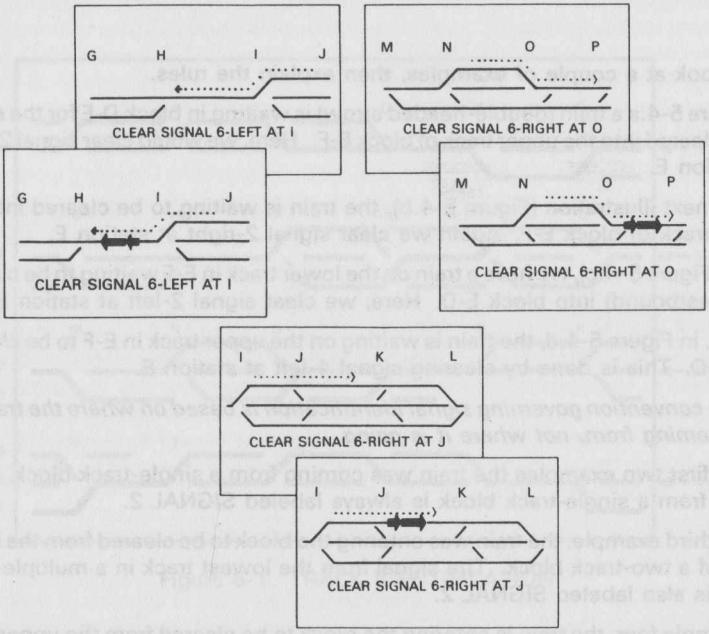


Figure 5-5. SIGNAL CLEARING EXAMPLES IN TRIPLE-TRACK BLOCKS

SUMMARY

- SIGNALS are even numbered (2, 4 or 6) from bottom to top, and followed by a letter designating direction (L or R).
- TRACKS are sequentially numbered (1, 2 and 3), with the mainline designated as track 2. Track below the mainline is track 1 and track above the mainline is track 3.
- SWITCHES are odd-numbered (1 and 3). The bottom switch is switch 1.

SECTION 6
SUPER DISPATCHER DISPLAYS

A number of displays are available to assist in running the simulation. This section briefly describes each display type. Consult the Function and Control Table on the insert in this manual for the key assignments for your computer to call specific displays.

SELECT SIMULATION – First option screen. Permits you to select and continue the run of a previously started simulation saved to disk.

SETUP SCREEN – Second option screen. Used to set simulation parameters and select territory on which the simulation will be run.

OVERVIEW – Display of territory. Shows train locations, signals cleared, switch alignments and other operating status parameters. Called by OVERVIEW key.

CLOSEUP – Detailed view of a single interlocking. Shows ID of each train in preceding and next block. Shows signal settings and switch alignments. Also contains a window showing overview of two stations on each side of detailed station. Shows mileage in blocks to each side of interlocking. A separate closeup screen is provided for each station on the territory. Called by pressing the alpha key corresponding to the station ID.

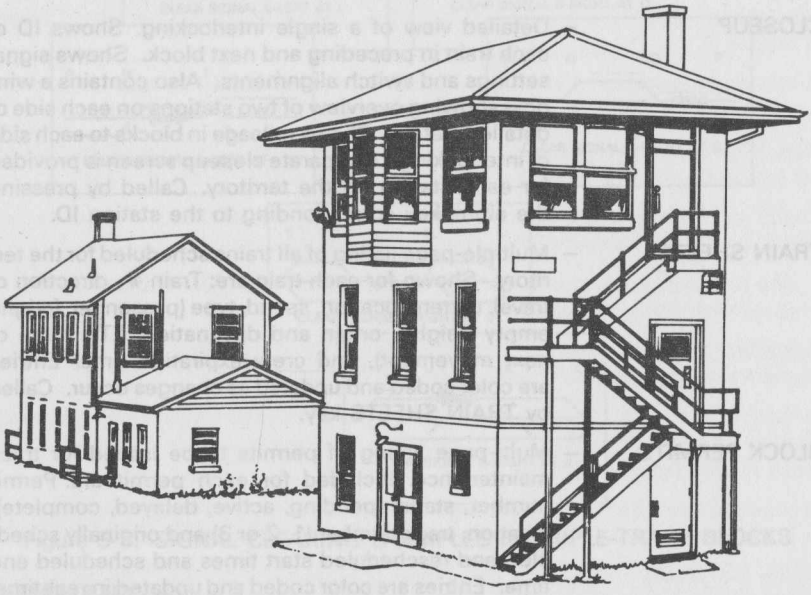
TRAIN SHEETS – Multiple-page listing of all trains scheduled for the territory. Shown for each train are: Train #, direction of travel, current location, speed, type (passenger, freight, empty freight), origin and destination, ETA (time of next movement), and crew expiration time. Entries are color coded and updated as changes occur. Called by TRAIN SHEETS key.

BLOCK PERMITS – Multi-page listing of permits to be issued for track maintenance. Included for each permit are: Permit number, status (pending, active, delayed, complete), location, track number (1, 2 or 3) and originally scheduled and rescheduled start times and scheduled end time. Entries are color coded and updated in real-time. Called by BLOCK PERMITS key.

BLOCK MILEAGE – With the OVERVIEW displayed block mileages (distance in miles between stations) may be overlaid on the overview screen by pressing the BLOCK MILEAGE key. Pressing it again removes mileage figures.

REQUEST TO CHANGE DIRECTION OF TRAIN – Prompt driven screen permits reversing a train's direction. Requires entry of train ID number. Maximum speed of a train moving in reverse is 10 mph. Called by pressing the REQUEST TO CHANGE TRAIN DIRECTION key.

SCORING SCREEN – Displays part and total scores for the simulation run. Performance measures include average train speed, clock speed, trains yarded and other factors. From this screen you may exit the program, save the current simulation to disk, review or continue operation, or start a new simulation run. Called by the ABORT key or automatically displayed at the conclusion of a simulation run.



SECTION 7
FUNCTIONS AND CONTROLS

The Dispatcher's Office

In a Dispatcher's Office equipped for Centralized Traffic Control (CTC) the Dispatcher sits at a console equipped with one or several video displays, a keyboard, and radio and telephone communications equipment. Dominating the room is a large wall display of the territory controlled by the dispatcher.

You control your territory from your computer keyboard. A keyboard template and a Function and Control Sheet included with this manual show the specific key assignments for your computer.

Operating Functions and Controls

Section 3, "Getting Started," described the procedure to load the SUPER DISPATCHER simulation program, and to select and setup a territory prior to starting your shift as dispatcher. Sections 4 and 5 introduced the default territory (terr1), explained how to move among closeup screens and introduced the conventions governing the numbering of tracks, switches and signals.

This section covers the various operating functions and controls used to perform the dispatching functions. Figure 7-1 lists the topics covered here.

7.1 SHIFT CLOCK
7.2 TRAIN SHEETS
7.3 BLOCK PERMITS
7.4 SIGNALING
7.5 FLEETING
7.6 SWITCH ALIGNMENT
7.7 TRAIN DIRECTION
7.8 TRAIN IDENTIFICATION
7.9 WARNING MESSAGES
7.10 STOPPING S SIMULATION RUN
7.11 SAVING A SIMULATION

Figure 7-1. FUNCTIONS AND CONTROLS

7.1 SHIFT CLOCK

Select Clock Speed (time multiplier)

A twenty-four hour clock is constanting displayed at the lower right corner of the terminal screen. The hour/minutes/seconds display is updated each second. In real-time, the clock will advance one second at each update. To operate the simulation at an accelerated pace you may select any update value between 01 and 59. For example, entering a value of "05" will cause the clock to advance by 5 seconds with each real-time second. Or, entering a value of "20" will advance the clock by 20 seconds each second. All simulator functions are driven by this clock, and all events will be accelerated according to the value entered. The simulation begins at 00:00:00 and ends at 08:00:00 (1 shift), 16:00:00 (2 shifts), or 24:00:00 (3 shifts). A one shift simualtion would require 8 hours to complete in real-time. Using an acceleration value of "20" will shorten the run time to 24 minutes.

Start Shift Clock

The simulation comes up with the OVERVIEW screen displayed and the clock stopped at 00:00:00. Before starting your shift you may "set-up" the territory by aligning switches and clearing signals in advance of the trains already on the territory. You may also wish to examine the train sheets and block permit displays, and possibly print out hardcopies of these before starting your shift.

When all preparations have been made, start the shift by pressing the "START SHIFT CLOCK" key. Once started, the clock will run until the shift ends (8, 16 or 24 hours). [See PAUSE, PRINT, ABORT commands]

7.2 TRAIN SHEETS

Display Train Sheets

Press the TRAIN SHEETS key to call the first page of the four-page Train Sheets Display. From the first page, additional pages are called by pressing the NEXT PAGE key. Press the PREVIOUS PAGE key to go back to earlier pages.

The Train Sheets show all trains on the territory at the start of the simulation and all those scheduled into the territory during the simulation run. The default simulation schedules a total of 60 trains onto the territory during the 24 hour simulation period. Most trains will enter the territory from the yards at each end (YA and YB), although some will be on the territory at the start, and others will come from "dark" (unsignalled) territory beyond Spur 2 and Spur 4.

Each simulation will be different, as the computer "builds" a new train sheet for each run.

Figure 7-2 shows a sample TRAIN SHEET page as it appeared before the simulation started. Column entries for each train include:

Train Number (NO) – 00 through 59

Direction of Travel (DIR) – E = East (to the right) and W = West (to the left)

Location (LOC) – Territory block identified by the stations at either end of the block. In this run six trains were on the territory at the start. A dash indicates the train is not on the territory.

Speed (SPD) – Current train speed. No trains are moving before the simulation starts.

Train Type (TYPE) – F = Freight, E = Empty Freight and P =Passenger.

Origination (ORIG) – Entry Point onto the territory:
YD-A = Yard A at Western and of the territory
YD-B = Yard B at Eastern end
SR-2 = Spur between stations S and T
SR-4 = Spur between stations P and Q
(Spurs 1 and 3 are not included in Territory 1 but may appear in other territories.)

Destination (DEST) – Scheduled exit point (Yard A or B or Spur 2 or 4)

Time of Next Scheduled Train Movement (ETA) – If moving, time it will reach the next signal block. If stopped (due to crew expiration), time it will resume travel in current block. If the train has not yet entered the territory, then ETA is the time it is currently scheduled to come onto the territory. Note that if a train is not promptly cleared onto the territory when it appears at the yard or spur entrance, the scheduled start time for all following trains will be delayed by fifteen minutes.

Crew Expiration Time (CREW) – Time at which train will stop (for 30 minutes) for a crew change.

TRAIN SHEETS PAGE 01

NO	DIR	LOC	SPD	TYP	ORIG	DEST	ETA	CREW
00	E	I-J	00	F	YD-A	YD-B	00:00	07:10
01	W	S-T	00	F	YD-B	YD-A	00:00	07:10
02	E	G-H	00	F	YD-A	YD-B	00:00	09:35
03	W	N-O	00	F	YD-B	YD-A	00:00	02:00
04	E	M-N	00	F	YD-A	YD-B	00:00	04:25
05	W	J-K	00	P	YD-B	YD-A	00:00	04:45
06	E	-	00	E	YD-A	YD-B	00:55	09:00
07	W	-	00	E	YD-B	YD-A	00:45	06:00
08	E	-	00	E	YD-A	YD-B	01:40	07:00
09	W	-	00	F	SR-2	YD-A	01:20	09:25
10	E	-	00	F	YD-A	SR-2	02:50	11:00
11	W	-	00	F	YD-B	YD-A	01:55	08:20
12	E	-	00	F	YD-A	YD-B	03:25	12:35
13	W	-	00	F	SR-4	YD-A	02:30	10:45
14	E	-	00	F	YD-A	SR-2	04:15	13:50
15	W	-	00	F	YD-B	YD-A	03:05	12:00
16	E	-	00	E	YD-A	YD-B	05:00	11:40

RATING 0000
TIME 00:00:00

Figure 7-2. TRAIN SHEET DISPLAY

BLOCK PERMITS PAGE 01

PER NO	STATUS	AREA	TRK NO	SCHED START	CURR START	CURR END
00	COMPL	N-O	1	01:50	01:50	02:40
01	ACTIVE	P-	1	02:40	04:00	05:15
02	ACTIVE	T-U	2	04:35	04:35	05:05
03	PEND	R-S	1	05:50	05:50	06:55
04	PEND	X-	2	07:30	07:30	08:45
05	PEND	R-S	2	08:20	08:20	09:00
06	PEND	B-C	2	09:45	09:45	11:15
07	PEND	-A	3	11:00	11:00	11:55
08	PEND	V-W	3	13:10	13:10	14:45
09	PEND	L-M	2	13:55	13:55	14:30
10	PEND	I-J	1	14:40	14:40	15:25
11	PEND	M-N	1	16:20	16:20	17:20
12	PEND	N-O	1	18:35	18:35	20:10
13	PEND	E-F	1	19:05	19:05	20:20
14	PEND	D-E	2	21:15	21:15	21:45
15	PEND	R-S	2	22:30	22:30	24:05

BLOCK PERMIT AT T-U 1 HOUR RATING 0200
PRINTOUT IN PROGRESS TIME 04:56:19

Figure 7-3. BLOCK PERMITS DISPLAY

The Train Sheet Page number (1-4) is displayed at the top-right corner of the screen. Rating (see Performance Measurement section) and Clock are displayed at the bottom-right of the screen. A Warning Message may be displayed at the bottom-left of the screen.

Train Sheets are updated in real-time (even while displayed) and entries are color coded according to train speed (see Appendix for color codes). The Train Sheet displays may be called at any time (the clock continues to run), and a printout of the page displayed obtained by pressing the PRINT key (clock stops during printing). Escape from the Train Sheets Display by Pressing another command key such as OVERVIEW or BLOCK PERMITS.

Print Train Sheets

A hardcopy of any Train Sheet Page may be made at any time during the simulation run. Press the TRAIN SHEET key to call the first Train Sheet. Use the NEXT PAGE and PREVIOUS PAGE keys to move to the sheet to be printed and press the PRINT key. The displayed page will be output to your printer. During printing the simulation clock stops. When printing is complete the clock resumes. You may page to another sheet and print it or escape from the Train Sheets display by pressing another command key (e.g., OVERVIEW). Periodically printing Train Sheets during the simulation (every hour or two) provides a record of train handling useful for performance analysis.

7.3 BLOCK PERMITS

Display Block Permits

Sections of track in the territory must be closed down periodically for work crews to perform right-of-way maintenance in safety. Press the BLOCK PERMITS key to display the first page of permits scheduled for the simulation run (see Figure 7-3). Use the NEXT PAGE and PREVIOUS PAGE keys to cycle between page 1 and page 2. Eighteen block permits are scheduled for the default simulation (the number varies across simulations and shifts. About 5 will be scheduled in an 8 hour shift).

Column entries for each block permit include:

Permit Number (PER NO) – 00 to ??

Current Status (STATUS) – Pending, Active, Completed or Delayed. A block permit will be "delayed" if the block is cleared or occupied at the scheduled start time. It may go into effect as soon as the train clears the block, or the signal is canceled. If the block is fleeted the block permit may go into effect after a train clears the block.

Location (AREA) – Block to be taken out of service.

Track Number (TRK NO) – Track 1, Track 2 or Track 3. Track 2 is the center, "mainline" track. Track 1 is the lower track and track 3 is the upper track.

Scheduled Start Time (SCHED START) – Planned time the block permit was to become effective.

Current Start Time (CURR START) – A new start time if the track was occupied or cleared at the scheduled start time.

Current End Time (CURR END) – The time the track will again become available to the Dispatcher.

When a Block Permit is ACTIVE the area affected is shown on the OVERVIEW and CLOSEUP screens in cyan (light blue) and enclosed by two large X's, as shown in Figure 7-4.

The Block Permits display is updated in real-time, and entries are color coded according to their status (pending = yellow, active = cyan, delayed = red and completed = green).

The procedures for escaping from the Block Permits Display or getting a hardcopy printout are the same as those for Train Sheets.

Print Block Permits

To obtain a hardcopy, call up the Block Permits display, go to the desired page and press the PRINT key. The simulation clock will temporarily stop during printing and will resume when printing is complete.

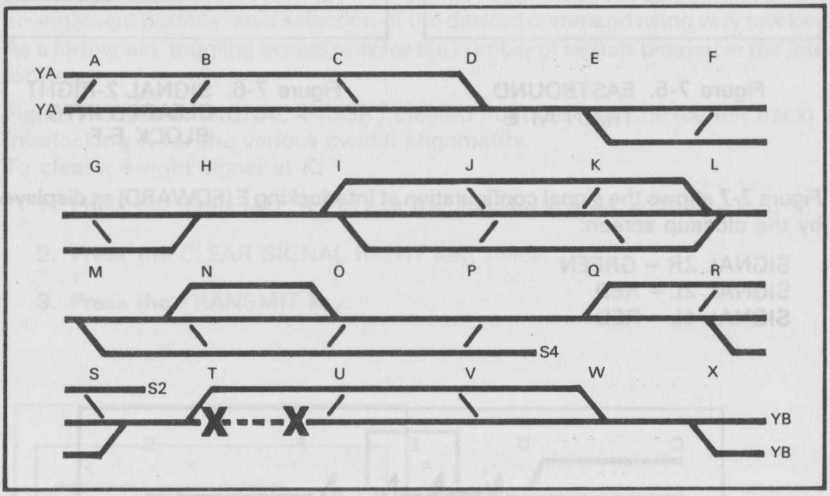


Figure 7-4. BLOCK PERMIT "ACTIVE" IN BLOCK T-U, TRACK 2

TRAIN CONTROL COMMANDS

The commands which follow are those issued by the Dispatcher from the CTC office to route and control trains over the territory. Included are clearing and cancelling signals to permit train movements through blocks and aligning switches to establish train routes. Fleeting commands are also included which allow the option of automatic clearing of signals for following trains.

7.4 SIGNALING

A train cannot move into a track section (block) until a green (clear) signal is displayed indicating that the track ahead is clear. Signals are controlled from the Dispatcher's Office – and from your computer keyboard.

Clear Signal 2-RIGHT

In Figure 7-5 an eastbound train is waiting for the signal to be cleared between stations E and F (block E-F). We must issue a "clear signal 2-right" command. To do this:

1. Press the "E" key to call the closeup screen of Interlocking E (signal and switch commands can only be issued from closeup screens).
2. Press the CLEAR SIGNAL RIGHT key, once.

   Notice the message "SIGNAL 2 CLEAR RIGHT" on the screen.
3. Press the TRANSMIT key

   The block from E to F should now look like Figure 7-6, with the arrows pointing right and colored green. The waiting train can now move to the right (eastbound) into block E-F.

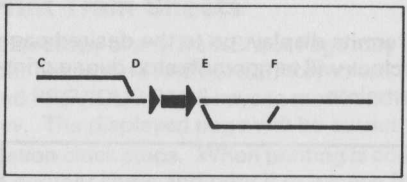


Figure 7-5. EASTBOUND TRAIN AT E

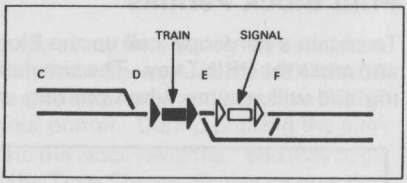


Figure 7-6. SIGNAL 2-RIGHT CLEARED INTO BLOCK E-F

Figure 7-7 shows the signal configuration at Interlocking E (EDWARD) as displayed by the closeup screen:

SIGNAL 2R – GREEN
SIGNAL 2L – RED
SIGNAL 4L – RED

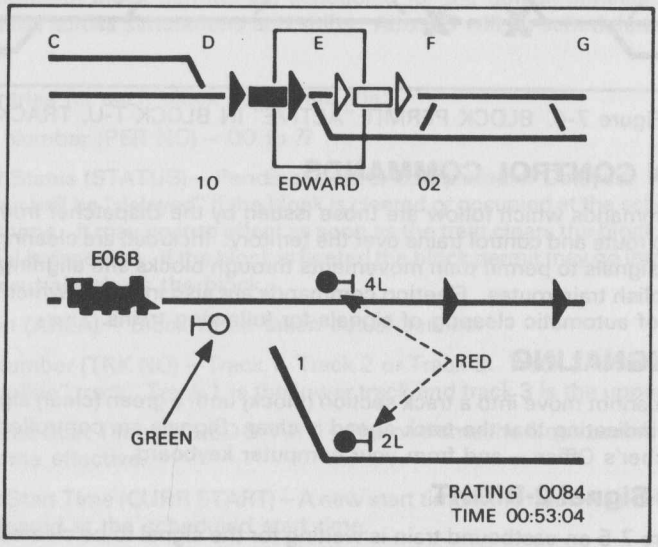


Figure 7-7. SIGNAL CONFIGURATION AT E: DETAIL DISPLAY

Cancel Signal Right

Occasionally, you may wish to CANCEL a cleared signal. Continuing with our example at Interlocking E:

1. Press E to display the closeup screen.
2. Press the CANCEL SIGNAL RIGHT key, once "SIGNAL 2 CANCEL RIGHT" is displayed at the bottom of the screen.
3. Press the TRANSMIT key. This will cancel the signal between E-F.

Clearing and Canceling Signals 4-RIGHT and 6-RIGHT

In step 2 of the instructions above you were instructed to press the CLEAR or CANCEL key once to initiate the CLEAR/CANCEL 2 command. These keys "toggle" through the signals. One press of the CLEAR SIGNAL RIGHT key sets up SIGNAL 2. Two presses set up SIGNAL 4. And three keypresses set up SIGNAL 6. This arrangement permits rapid selection of the desired command using very few keys. As a further aid, toggling occurs only for the number of signals present in the interlocking.

Figure 7-8. shows SIGNAL 4-RIGHT cleared from the mainline (center track) at Interlocking K for the various switch alignments.
To clear a 4-right signal at K:

1. Press the alpha key "K" to call the closeup screen at Interlocking K.
2. Press the CLEAR SIGNAL RIGHT key, twice.
3. Press the TRANSMIT key.

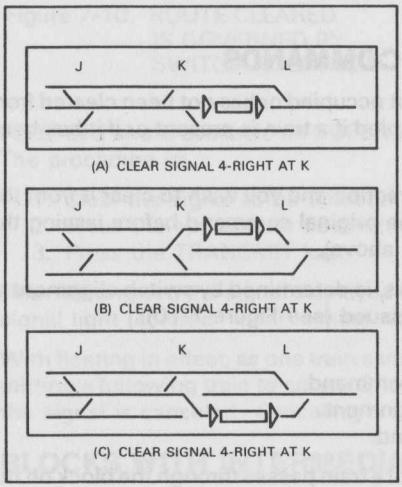


Figure 7-8. CLEARING SIGNAL 4-RIGHT IN TRIPLE-TRACK SECTIONS

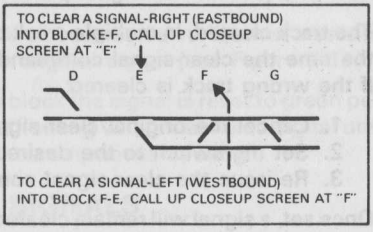


Figure 7-9. SELECTING INTERLOCKINGS

One of the three tracks to the right of K should be cleared (green arrow) as shown in Figure 7-8. If a signal did not clear, then either the track controlled by the signal is already occupied (train or block permit present), or a conflicting signal is cleared out of the interlocking.

To clear a SIGNAL 6-RIGHT at interlocking K: call the interlocking closeup screen as above; press the SIGNAL RIGHT key three times; and press the TRANSMIT key. Depending on switch alignment, either the top track from K to L will be cleared (switch 3 set to normal) or the signal will not take effect. Note that there is no route from the top track (controlled by signal 6) down to the mainline for eastbound traffic at K. Switch 3 at K is a crossover that allows westbound traffic to move from the top track down to the mainline, or eastbound traffic to move up from the mainline to the top track.

If all this seems confusing – don't worry. It will take some time, and experience, to sort out all the interactions between signals and switches. We recommend "doing it" as the best way to learn. Start the simulation, call up an interlocking, and experiment!

Clearing and Canceling Signals 2 LEFT, 4 LEFT and 6 LEFT

Clearing a signal to the left permits a train to move to the West. The procedure to clear left is the same as to clear right with one important difference. Above, to clear a signal in block E-F, we called the closeup screen for Interlocking E. This allowed us to clear/cancel signals to the right into Block E-F. To clear a signal LEFT into the same block we must do it from the Interlocking F closeup screen (see Figure 7-9).

RULES GOVERNING SIGNAL COMMANDS

A signal may be set anytime a block is not occupied or has not been cleared from the opposing direction. A block is occupied if a train is present or if it has been taken out of service by a Block Permit.

If a block has been cleared from one direction and you wish to clear it from the other direction, you must first cancel the original command before issuing the new one (see cancel signal procedure, above).

The track cleared, in multiple-track blocks, is determined by switch alignment at the time the clear-signal command is issued (see Figure 7-10).
If the wrong track is cleared:

1. Cancel the original clear-signal command,
2. Set the switch to the desired alignment,
3. Re-issue the clear-signal command.

Once set, a signal will remain cleared until a train passes through the block on the cleared track. When the train exits the block the signal resets to red (Exception – see Fleeting).

A train may not enter a block until the signal into it has been cleared. One block cleared ahead of a train permits it to enter, but restricts it to slow speed. At least two blocks must be cleared in front of a train before it can travel at maximum speed.

7.5 FLEETING

Normally, a cleared signal resets to red as soon as a train passes through a block, and the signal must be cleared again to permit following traffic to enter the block. Many automatic signal systems now contain "stick" logic that permits the dispatcher to set up blocks in the territory that will automatically re-clear for a following train once the leading train has exited the block. This feature is called

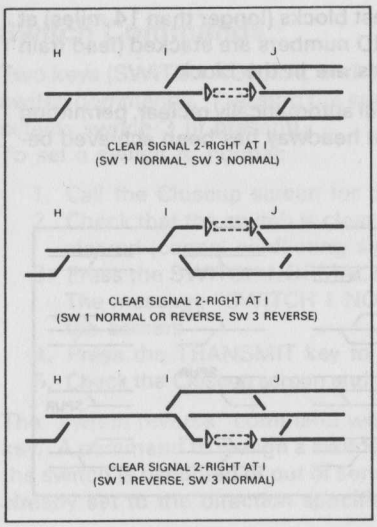


Figure 7-10. ROUTE CLEARED IS GOVERNED BY SWITCH ALIGNMENT

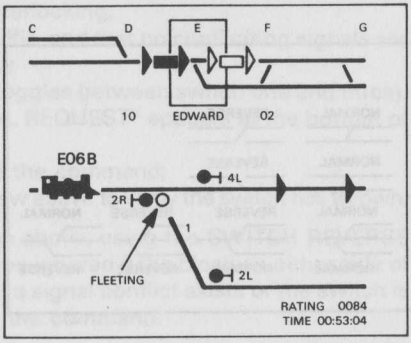


Figure 7-11. SECOND SIGNAL LIGHT INDICATES SIGNAL IS FLEETED

FLEETING and is available on SUPER DISPATCHER. Any signal may be fleeted. The procedure is:

1. Clear the signal to be fleeted,
2. Press the appropriate fleeting key, (FLEET LEFT OR FLEET RIGHT)
3. Press the TRANSMIT key.

With fleeting set, the signal displayed on the closeup screen will show a second signal light (colored "lunar" white) next to original signal (see Figure 7-11).

With fleeting in effect, as one train exits the block the signal is reset to green permitting a following train to enter. Once set, fleeting will remain on a signal until the signal is canceled. Canceling a signal also removes fleeting.

BLOCKS WITH INTERMEDIATE SIGNALS

Blocks 9 miles in length or less are controlled by one signal. Only one train at a time can be in these blocks. Longer blocks are equipped with additional intermediate signals, allowing occupancy by more than one train at a time. For example, blocks 10-14 miles long are controlled by two signals and blocks 15 miles or longer in length have three signals.

The intermediate signals in a long block are "transparent" to the dispatcher. In normal signaling mode (fleeting disabled) the dispatcher clears the signal at the block entrance, a train enters, and the block appears on the display as "occupied" until the train exits the block. However, if the dispatcher attempts to clear the signal into the block while the train is still in the block, and the train has moved at least 5 miles into the block, the signal will clear and the following train will be permitted into the block. The cleared signal will appear on the Overview screen as a short green arrow at the beginning of the block.

As many as three trains may occupy the longest blocks (longer than 14 miles) at the same time. On the Closeup screen train ID numbers are stacked (lead train on the bottom) to indicate that multiple trains are in the block.

Longer blocks that are cleared and "fleeted" will automatically reclear, permitting following trains into the block when sufficient headway has been achieved between trains.

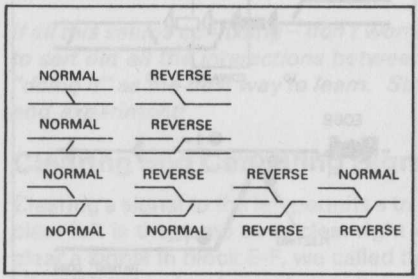


Figure 7-12. SWITCH ALIGNMENTS

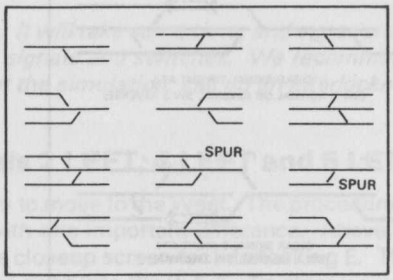


Figure 7-13. INTERLOCKING SWITCH COMBINATIONS

7.6 SWITCH ALIGNMENT

Trains are routed through the territory by aligning the switches located at each interlocking.

Switches are controlled from the Dispatcher's office, and are "thrown" remotely by commands set and transmitted by the Dispatcher. Keys on your computer keyboard are dedicated for switch commands (see the Function and Control Table on the insert in this manual for key assignments for your computer).

In this simulator, as in actual CTC territories, control of switches is interlocked with signal status and track occupancy. A switch can not be realigned when a train is over it or when a signal clearing track in the vicinity would be in conflict with the new alignment.

Switch Normal and Switch Reverse

A switch may be set to one of two positions – Normal or Reverse (See Figure 7-12). A switch set to NORMAL lines the track for straight-ahead movement of a train on the same track. A switch set to REVERSE diverts a train from one track to another.

Figure 7-13 shows the 12 switch configurations found in SUPER DISPATCHER territories. Note that at interlockings where one or two tracks diverge into three tracks both switches must be set to normal for straight-through movement on the mainline. Also, switch 1 must be set normal and switch 3 set to reverse to permit movement between the mainline and the upper track (see example in Figure 7-12). The train must first pass over switch 1 and then switch 3 as it moves through the interlocking from the mainline to the upper track.

Switch Commands

Two keys (SWITCH NORMAL and SWITCH REVERSE) are dedicated for setting switch commands. Pressing the key once selects switch one. Pressing it again selects switch 3 (if present).
To set a switch to normal:

1. Call the Closeup screen for the interlocking;
2. Check that the switch is clear of traffic, and that no confliciting signals are cleared (cancel conflicting signals);
3. Press the SWITCH NORMAL key (toggles between switch one and three). The message "SWITCH 1 NORMAL REQUEST" appears at the bottom of the screen;
4. Press the TRANSMIT key to send the command;
5. Check the Closeup screen and window above to verify the switch has thrown.

The "switch reverse" command works as above, using the SWITCH REVERSE key. A command to realign a switch will be ignored if the block on either side of the switch is occupied or out of service, if a signal conflict exists or the switch is already set to the direction specified in the command.

7.7 CHANGE TRAIN DIRECTION

Probably the most frequently requested enhancement to the original TRAIN DISPATCHER program was to be able to reverse trains. It was possible in that simulation, as it is in this one, to get trains head-to-head or cleared to a track section taken out by a block permit. Also, in SUPER DISPATCHER it is possible to clear a train past its exit point (Spur 2 or 4 in Territory 1).

Although a penalty is paid for doing so (maximum backing speed is 10 mph), trains may be backed up in this simulation.
To change a train's direction:

1. Check the Closeup screen or Train Sheet to get the train number;
2. Call up the "REQUEST TO CHANGE DIRECTION" screen by pressing the "CHANGE TRAIN DIRECTION" key;
3. Enter the 4-digit ID number of the train to be reversed.

If a valid train identification number is entered a message will display indicating that the train is now in reverse, and the following changes will occur:

a. the color of the train ID number will change from white to yellow (on the closeup display);
b. the arrows on the OVERVIEW showing train direction will reverse;
c. the maximum speed of the train will be 10 mph.

A backing train will not move out of the block it is in until the signal is cleared into the block behind it (in the direction it is moving).

To return the train to forward, the REQUEST TO CHANGE TRAIN DIRECTION screen must be called again and the proper train ID number entered.

7.8 TRAIN IDENTIFICATION

Each train is assigned a unique 4-character identification number. The three parts of this number are:

1. Train type (first character)
   F = FREIGHT
   E = EMPTY FREIGHT
   P = PASSENGER
2. Location on Train Sheet (characters 2 and 3)
   00 through 59
3. Destination (last character)
   A = Yard A
   B = Yard B
   1 = Spur 1
   2 = Spur 2
   3 = Spur 3
   4 = Spur 4

The train ID "F01A" identifies the train as a Freight, listed second on the train sheet (after 00), with Yard A as its destination.

Train identification numbers are shown on the Closeup displays. They are color coded to indicate train status:

white = normal status
yellow = train in reverse
red = derailment or hot box or crew expiration

Each train type (passenger, freight, empty freight) has different speed limits. Maximum speed for a passenger train is 70 mph. Loaded freights may not exceed 50 mph and empty freights may travel up to 60 mph. See the TABLE OF TRAIN SPEEDS in the Appendix for a listing of all speed limits.

7.9 WARNING MESSAGES

Throughout the simulation "warning messages" will appear in the lower left corner of your screen. The computer continuously tracks the status of trains on the territory and also "looks ahead" to identify events the dispatcher needs to plan for (or around).

Four message categories are:

1. Look-ahead to warn of pending events
   "BLOCK PERMIT AT T-U 1 HOUR"
   "TRAIN F06A EXPIRE 1 HOUR"
2. Events starting
   "BLOCK PERMIT AT T-U ACTIVE"
   "TRAIN F06A CREW EXPIRED"
3. Reminders for events in progress
   "TRAIN E00B IS IN REVERSE"
   "TRAIN F142 WENT PAST SPUR"
4. Alerts concerning accidents or problems
   "TRAIN F40A HOT BOX ALARM"
   "TRAIN E29B DERAILED"

The appearance of a warning message is accompanied by an audible tone. The message will flash, and remain displayed until the ACKNOWLEDGE key (see Insert for key assignment) is pressed. Messages are queued. New messages may be generated before the old message is acknowledged, but the next message will not display until the message display area is cleared by pressing the "ACK" key. The queue will hold 20 messages. Certain reminder messages will periodically be repeated (e.g., train went past spur) until the condition is corrected.

7.10 STOPPING A SIMULATION

Once the shift clock is started, a simulation will run until the shift (or shifts) is/are complete.

Pause Simulation

A run may be stopped, temporarily, by pressing the PAUSE key (see Insert for key assignment). This blanks the screen and suspends all activity. Press any key to continue the run.

Abort Simulation

A simulation run may be stopped at any time by pressing the ABORT key (see Insert for key assignment). This suspends the run and displays the SCORING SCREEN (see Section 8, Performance Measurement). An aborted simulation (stopped before shift is completed) may be saved to disk for completion at another session.

Other options include:

1. Continue simulation run;
2. Start new simluation; or
3. Exit simulation program.

Option 1. is similiar to pausing the run. When the ABORT key is pressed the simulation is suspended and the scoring screen is displayed. Your score is calculated to the time operation was suspended. Choosing the "Continue" option picks up operation from where it was stopped.

7.11 SAVING A SIMULATION

An aborted simulation may be saved to disk. As all parameters are saved, considerable space is required on the disk.

★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★

WARNING

124 disk blocks required to store an aborted simulation.

★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★

Instructions are given on the SCORING SCREEN for saving an unfinished simulation run.

SECTION 8
PERFORMANCE MEASUREMENT

Dispatcher performance is monitored and displayed during the simulation (RATING), and a Scoring Screen (Figure 8-1) is displayed at the conclusion of operation (end of shift or abort).

SUPER DISPATCHER

TOTAL TRAIN MILES		2850
TIME MULTIPLIER		15
TERRITORY DIFFICULTY		68
BASE SCORE		18330
CREW EXPIRATIONS	1	−200
HOT BOXES	2	200
DERAILMENTS	0	0
TRAINS YARDED	18	1800
TOTAL SCORE		**20130**

PRESS: F1 TO EXIT
F3 TO SAVE SIMULATION
F5 TO CONTINUE OR REVIEW
F7 TO START NEW SIMULATION

Figure 8-1. SCORING SCREEN

Performance Rating

The RATING score displayed above the shift clock during operation is a "moving average" of performance over the last 60 minutes of operation. RATING is based on the total distance traveled by all trains during that time. To prevent the performance rating from jumping to an artificially-high level at the beginning of a run, startup logic has been included to adjust RATING until train speeds have become normalized.

End of Simulation Scoring

The final "TOTAL SCORE" is derived from seven scoring factors. The major component, "BASE SCORE," is the weighted product of total miles traveled, time multiplier, level of difficulty of the territory and simulation run time.

BASE SCORE is then adjusted to obtain the TOTAL SCORE. Adjustments include point deductions (debits) for crew expirations occurring while a train was on the territory, and point additions (credits) for events over which the Dispatcher had no control (hot boxes and derailments). As the objective is to get trains to their destinations additional points are awarded for each train reaching its assigned yard or spur. No TRAINS YARDED points are awarded to misrouted trains exiting at locations other than their assigned destinations.

The derivations for the various scoring factors are shown in Figure 8-2.

Hot Box and Derailment Logic

Hot box alarms and derailments are generated at irregular intervals during a simulation run. Although the number will vary considerably, usually only one or two hot box alarms will occur during an 8 hour shift. Hot boxes cause a train to stop for a short period of time (30 minutes). Derailments are less likely to happen. Many shifts will pass without a derailment. Only one derailment may be generated during any simulation run. A derailment stops the train for two to nine hours.

End-of-Run Options

When a run has been completed and the SCORING SCREEN is displayed, options are presented (see Figure 8-1) to:

1. Exit the simulation
   Press the EXIT key to return to basic.

2. Save the Simulation
   The completed simulation may be saved to disk. The disk must be preformatted, and have at least 124 blocks free. Completed simulations, when reloaded may be reviewed but will not run. Aborted simulations, on the other hand, will run upon reloading, with operation continuing from the time at which the simulation run was stopped.

3. Review the Simulation
   Press the REVIEW key. This calls the OVERVIEW screen as it appeared at the end of the run. All other screens (train sheets, block permits) may also be called. Return to the SCORING SCREEN by pressing the ABORT key.

4. Start new Simulation
   Press the RESTART key to clear the current simulation and call the first setup screen.

SCORING FACTORS

RATING (R)
R = Total number of train miles traveled during last 60 minutes

TOTAL TRAIN MILES (TTM)
TTM = Total train miles traveled

TIME MULTIPLIER (TM) [difficulty level factor]
TM = [value between 01 and 59]

TERRITORY DIFFICULTY (TD) [difficulty level factor]
TD = [value between 10 and 100]
Component factors include total miles in territory and number of blocks.

BASE SCORE (BS)
BS = (TTM X 5) + (TM X TD X # HRS/4)

CREW EXPIRATIONS (CE) [debit points]
(each) CE = 200 points deducted

HOT BOXES (HB) [credit points]
(each) HB = 100 points added

DERAILMENTS (DR) [credit points]
DR = (HRS DERAILED X 200) points added

TRAINS YARDED (TY) [credit points]
(each) TY = 100 points added

TOTAL SCORE (TS)
TS = BS − (200 X CE) + (100 X HB) + (200 X HRS DERAILED) + (100 X TY)

Figure 8-2. SCORING FACTORS

APPENDIX

INTERLOCKING NAMES AND BLOCK MILEAGES

TRAIN SHEET COLOR CODES

BLOCK PERMIT COLOR CODES

TRAIN SPEED RESTRICTION TABLE

WARNING MESSAGES

INTERLOCKING NAMES AND BLOCK MILEAGES

INTERLOCKING		MILEAGE TO NEXT STATION		
		TERR1	TERR2	TERR3
A	ADAMS	3	8	2
B	BECKER	4	3	10
C	COOPER	3	11	3
D	DRUM	10	4	4
E	EDWARD	2	3	3
F	FRENCH	11	4	2
G	GRACE	2	2	3
H	HUMPHREYS	3	17	2
I	IRVINE	16	3	17
J	JOHNSON	4	11	4
K	KOCH	5	2	11
L	LAHR	6	4	3
M	MILLSTONE	12	12	21
N	NICKERSON	5	5	4
O	OAKS	4	9	3
P	PETERS	4	3	9
Q	QUEEN	9	16	3
R	REESE	3	4	3
S	SULA	4	11	4
T	TOOMEY	6	3	12
U	UNION	7	8	2
V	VALLEY	3	4	14
W	WILLIAMS	4	10	3
X	XENON			
TOTAL MILEAGE		130	157	142

TRAIN SHEET COLORS

MAXIMUM SPEED	GREEN
SLOW SPEED	YELLOW
BACKING	YELLOW
STOPPED	RED
DESTINATION REACHED OR EXITED FROM TERRITORY	CYAN
CREW EXPIRED	PURPLE
NOT YET ON TERRITORY	WHITE

BLOCK PERMIT COLORS

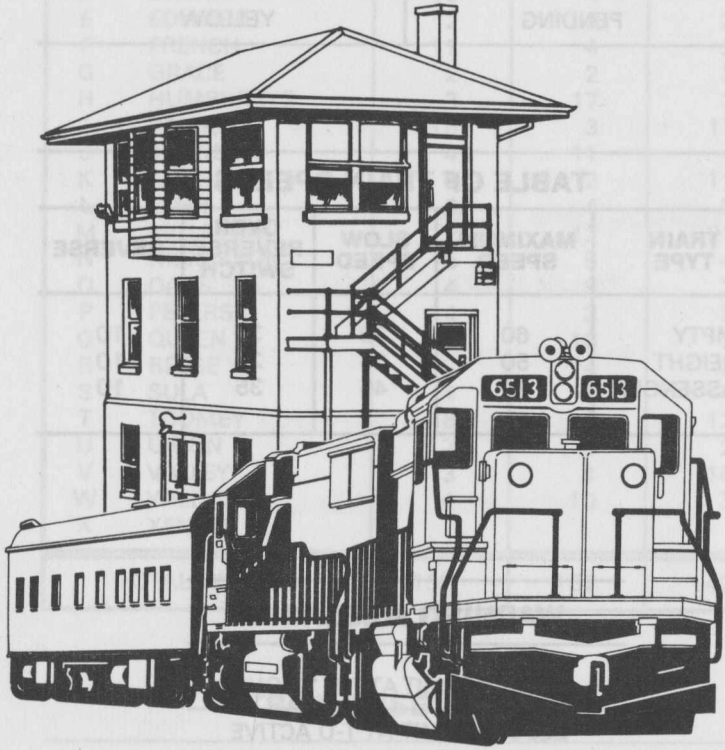
BLOCK PERMIT STATUS	COLOR CODE
ACTIVE	CYAN
COMPLETED	GREEN
DELAYED	RED
PENDING	YELLOW

TABLE OF TRAIN SPEEDS

TRAIN TYPE	MAXIMUM SPEED	SLOW SPEED	OVER REVERSE SWITCH	REVERSE
EMPTY	60	30	30	10
FREIGHT	50	25	25	10
PASSENGER	70	45	35	10

WARNING MESSAGES

BLOCK PERMIT AT T-U 1 HOUR
BLOCK PERMIT AT T-U ACTIVE
TRAIN F05A EXPIRE 1 HOUR
TRAIN F05A CREW EXPIRED
TRAIN F132 WENT PAST SPUR
TRAIN E29A DERAILED
TRAIN F04B HOT BOX ALARM
TRAIN E00B IS IN REVERSE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